

CHAPTER 10

Contaminated Media

10.1 Introduction

This chapter provides data on the volume and location of contaminated media¹ managed by the Department of Energy (DOE). The data summarize the following reported volumes: inventory (storage), new generation, treatment, receipts, and disposal. Throughout the chapter, the data summarize the actual volumes of contaminated media managed during fiscal years (FY) 1998 and 1999, and they provide the most current DOE projections for contaminated media through FY 2010. Because future volume estimates are continually revised as site characterization proceeds and remedies are selected and implemented (e.g., site assumptions change, site officials learn more about the extent and type of contamination present), projections are not provided past FY 2010.²

10.1.1 Contaminated Media Definition and Explanation

Hazardous and radioactive substances from nuclear weapons production, research, development, and testing activities and other DOE programs have resulted in contaminated media on and around DOE sites. Some waste streams were discharged to the environment with or without prior treatment. These include relatively small, localized releases that may have resulted from accidents; larger planned releases of process effluents; and releases on a much larger scale, such as atmospheric fallout from nuclear weapons tests. In other cases, containment systems such as tanks, drums, or landfills lost their integrity and waste leaked into adjacent media. Contaminated media also results from spills and other inadvertent releases during process operations or maintenance.³

The FY 2000 EM Corporate Database defines contaminated media (also referred to as contaminated environmental media)⁴ as “materials such as soil, sediment, surface water, ground water, and others (e.g., sludge and rubble/debris that are intermixed with media) that are contaminated at levels requiring cleanup or requiring further assessment to determine whether an environmental restoration action is warranted.” Contaminated media do not include materials that may have economic value, standing structures and equipment, sanitary waste, or construction/demolition debris.⁵ Interpretations sometimes differ as to what constitutes contaminated media and how it should be tracked. For a description of issues with defining and quantifying contaminated media, see Highlight 1 on the following page.

¹ This report reflects the FY 2000 EM Corporate Database – and Central Internet Database (CID), through which the Corporate Database data can be viewed – categorization and definition of contaminated media. Other sources may define contaminated media slightly differently.

² However, the CID includes contaminated media projection data through FY 2070. Some limited post-FY 2010 projections are provided in the LLW and MLLW chapters in order to compare the volumes of radioactive waste and contaminated media.

³ U.S. Department of Energy, Office of Environmental Management, *Linking Legacies: Connecting the Cold War Nuclear Weapons Production Processes to Their Environmental Consequences*, DOE-EM-0319 (January 1997).

⁴ The CID uses the terms “contaminated media” and “contaminated environmental media” interchangeably.

⁵ U.S. Department of Energy, Office of Environmental Management, *Linking Legacies: Connecting the Cold War Nuclear Weapons Production Processes to Their Environmental Consequences*, DOE-EM-0319 (January 1997).

Highlight 1

Issues with Defining and Quantifying Contaminated Media, from U.S. Department of Energy, Office of Environmental Management, *Linking Legacies: Connecting the Cold War Nuclear Weapons Production Processes to their Environmental Consequences*, DOE-EM-0319 (January 1997).^a

"The problem resulting from the release of a contaminant can be defined in several ways, and each definition can result in a different volume. The definition most often used by the DOE in determining the volume of affected media that should be tracked and commonly used by stakeholders and regulatory agencies is the volume of contaminated media in which the contaminant is thought to be present above an action level. This approach is subject to some inevitable uncertainties because of shortcomings of the characterization technology, statistical uncertainties introduced in the characterization process itself, and modeling uncertainties in using the data to determine where contaminants are now or to predict where they may migrate in the future.

Other definitions (e.g., the volume of the contaminant released to the media, the volume of media containing contaminants above detection levels, the volume of ground water to be pumped to the surface for treatment, or, in the case of a contaminated aquifer, the entire aquifer which must be specially managed to prevent the spread of contamination) can result in much larger or smaller volumes. Some definitions, such as the volume of the material released, provide results with limited use because they do not consider how the contaminants have affected the environment or the risks they pose to humans.

For example, at the Y-12 Plant in Oak Ridge, Tennessee, an estimated 240,000 pounds of mercury metal used in the lithium enrichment process are thought to have been released to the surface water around the site. In its pure form, this mercury amounts to about 20 cubic meters (5,300 gallons). However, the volume of contaminated sediments resulting from the releases is many thousand cubic meters. Some of the sediments will be cleaned up, and the remainder may be subject to future restrictions."

^a Although this information is taken from **U.S. DOE Linking Legacies**, these issues continue to be present for those involved in the management of contaminated media.

Contaminated media can be managed ex- or in-situ. Ex-situ contaminated media are contaminated environmental media that have been or are planned to be remediated by: 1) excavating or otherwise removing the contaminated media from the ground/environment; 2) treating when appropriate; and 3) disposing of these media either back in their initial location after treatment or in a specifically designed facility that isolates the media from the environment.⁶ The Central Internet Database⁷ (CID) provides (separately) the reported volumes of ex- and in-situ contaminated media.⁸

In-situ contaminated media are contaminated media that have been remediated, or are likely to be remediated, without excavation by using strategies that destroy, isolate, or prevent any further spread of contaminants into the surrounding environment⁹ (e.g., in-situ treatment, capping in place, and institutional controls).

⁶ U.S. Department of Energy, Office of Environmental Management, *Linking Legacies: Connecting the Cold War Nuclear Weapons Production Processes to Their Environmental Consequences*, DOE-EM-0319 (January 1997).

⁷ The ex- and in-situ contaminated media data in the CID are from the FY 2000 EM Corporate Database. See Highlight 2 and Chapter 1 for more information.

⁸ For in-situ contaminated media, DOE sites are requested to report the current year's total estimated volume (entered as an average or a range). For these quantities, DOE sites are also requested to report one or more management activity for the entire quantity, not for specific future years or year ranges.

⁹ U.S. Department of Energy, Office of Environmental Management, *FY 2000 Detailed Guidance for the Integrated Planning, Accountability, and Budgeting System-Information System (IPABS-IS) Volume 2*, (February 2000).

Media vs. Waste¹⁰

Contaminated media differ from radioactive waste (i.e., process waste) in that contaminated media generally have much lower concentrations of radioactive and chemically hazardous substances. Much of the contaminated media are the result of past activities (e.g., spills, waste disposal, and environmental releases such as liquid discharges to drainage basins). Unlike radioactive waste, contaminated media are generally highly heterogeneous both in physical form and chemical constituency.

Environmental Restoration

The DOE's Field Offices manage the remediation of contaminated media as part of environmental restoration efforts aimed at expediting cleanup wherever and whenever possible. Environmental restoration activities are prioritized based upon several factors, including the need to eliminate risks at sites not controlled by the federal government, the goal of reducing risks at all sites, and compliance with various laws, regulations, and agreements. Most actions are designed to either remove or contain contamination in the environment – such as contaminated soil, debris, and ground water – or to decommission contaminated structures including reactors, chemical processing buildings, and support facilities. Related activities to support remediation actions include treatment of contaminated materials and waste, transportation of these materials and waste to storage and disposal facilities, and disposal of waste in permitted facilities.

Environmental restoration activities include cleanup of buildings and areas that supported defense-related activities, such as nuclear weapon component fabrication, and non-defense, civilian nuclear power activities, such as the development of heat sources for the space program and the operation of small test reactors. Remedial actions are concerned with all aspects of the assessment and cleanup of inactive sites at which releases of radioactive and chemically hazardous substances have occurred. These actions are not limited to the areas directly impacted by the release but also include additional areas to which contaminants may have migrated (such as to ground water).

Cleanup goals and remedies for each contaminated area are developed through processes established by federal and state laws and other legal agreements. These processes involve decision-makers outside the DOE, such as the EPA and the impacted state, and include input from other stakeholders, such as local citizens and national environmental groups. The principal regulatory requirements for remediation activities are derived from the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA). Activities may be subject to further requirements associated with compliance with the National Environmental Policy Act (NEPA) and with regulatory requirements imposed by the states. Other requirements are set forth in various DOE Orders and standards and in other guidance documents.

The first steps in the remediation process for contaminated media are to identify the contaminants of concern, determine the extent of contamination, and assess potential threats to human health and the environment. If a significant contamination problem is indicated and if a fast and limited cleanup or containment action could mitigate this problem, the DOE may conduct an expedited response action or interim remedial action.

Upon completion of characterization, a detailed analysis of remedial alternatives is conducted. This analysis is followed by a formal decision-making process that may include public meetings and a formal public comment period. If the results of the analysis indicate that 1) a contaminated area does not pose a threat to human health or the environment or 2) a previously completed limited action adequately addressed the contamination condition, a determination that “no further action” (NFA) is necessary may be made. Such a determination would be made in conjunction with the EPA, the host state, and other

¹⁰ Information in this section is taken from U.S. Department of Energy, Office of Environmental Management, *Integrated Data Base Report—1996: U.S. Spent Nuclear Fuel and Radioactive Waste Inventories, Projections, and Characteristics*, DOE/RW-0006, Rev. 13 (December 1997).

stakeholders. However, if a threat is deemed to be present, the appropriate action would be identified and implemented.

A wide range of actions, including NFA, can be implemented to address environmental contamination problems at DOE sites. Current and projected land use is a key component in the decision-making process. For example, in-situ remedies that rely on containment of contaminated materials would be appropriate for the large DOE reservations that are projected to remain under the control of the federal government. In contrast, ex-situ remedies in which contaminated materials are exhumed for treatment and disposal at off-site locations would likely be appropriate for small sites destined to be released for unrestricted or industrial (non-DOE) uses.

No further action may be considered when, based upon technical evidence, a site or area of a site does not warrant any or any more remedial action based on the risks or conditions present.¹¹ Criteria for NFA decisions are site-specific; they typically must demonstrate that there is no current or potential threat to human health or the environment.¹² A NFA decision may or may not mean that cleanup is complete or that contamination no longer exists. In some cases, NFA may mean that further cleanup is not deemed necessary. For example, if a site's future land use is expected to be industrial (versus unrestricted use), a NFA decision may be appropriate as long as the site has been cleaned to industrial use standards.

In any case, the most appropriate action to be taken at any given area is site-specific and depends on the types of contaminants present, the medium in which they are found, and the likelihood of current or future exposures.

Highlight 2. About the Data in This Chapter

- The FY 2000 DOE EM Corporate Database provided the data for this chapter. The data in the EM Corporate Database are available through the Central Internet Database (CID), located at <http://cid.em.doe.gov>. (Please see Chapter 1 for more information on both the EM Corporate Database and the CID.)
- The contaminated media quantity data in this report are presented according to various categories, i.e., by the amount in inventory, generated, treated, received, etc. When considered across these categories, the data are not necessarily mutually exclusive. In other words, a particular amount of contaminated media may be generated, treated, and disposed of – all during the same fiscal year. The same holds true for data on projected contaminated media. For these reasons, this report does not provide data summaries across the different data categories that would misleadingly suggest data exclusivity.
- The data in this report are in a summary format (i.e., by site rather than by waste stream). The CID offers additional details (e.g., stream level data, or comprehensive data about a specific site or activity).
- The ex-situ and in-situ contaminated media quantity data in this report are rounded to the nearest cubic meter. Exceptions occur if the data show less than one cubic meter. In these cases the data are rounded to one significant digit.
- This chapter does not provide information about contaminated media constituent types or radioactivity because this information is not collected at the national level. However, Chapter 7 provides information about the radioactivity of previously-disposed LLW contaminated media and Chapter 6 provides information about the radioactivity of previously-disposed transuranic waste.
- Data on 11e(2) byproduct material are provided in Chapter 9.

¹¹ U.S. Department of Energy, Office of Environmental Management, *A Report to Congress on Long-Term Stewardship, Volume I*, DOE/EM-0563 (January 2001).

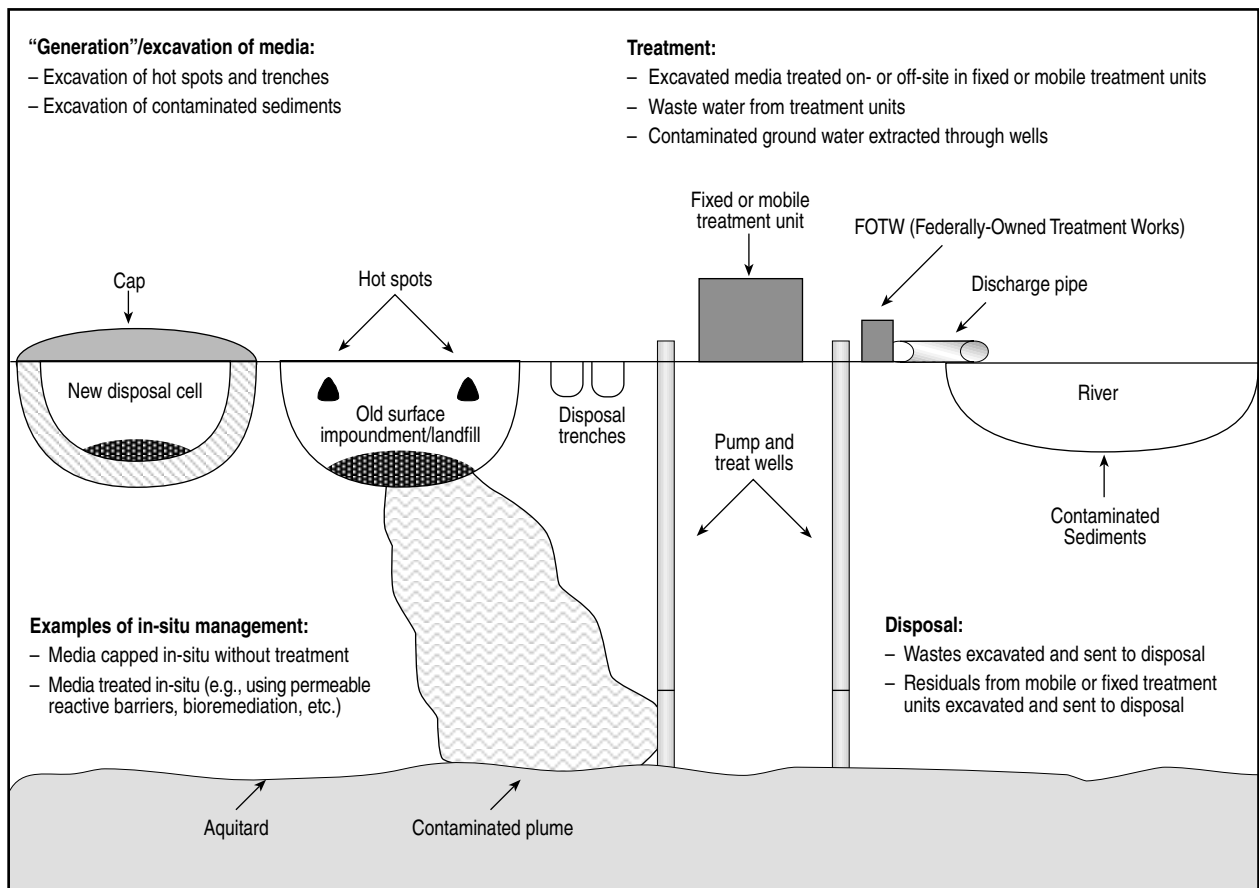
¹² Ibid.

Management of Contaminated Media

The graphic below provides examples of how contaminated media can be managed at DOE sites. Ex-situ contaminated media are “generated” when they are excavated as part of a remedial action. For example, excavating contaminated soil from underneath a contaminated building would be considered “generation” of a volume of media requiring further management.

Ex-situ contaminated media treatment is the method, technique, or process designed to change the physical or chemical character of the media (once they have been “generated”/excavated), in order to: 1) render the media less hazardous; 2) make the media safer to transport, store, or dispose; or 3) reduce the volume of media. Ex-situ contaminated media are in inventory when they have been excavated and placed in storage. Ex-situ contaminated media are disposed when they have been excavated and emplaced in a manner that ensures protection of human health and the environment within prescribed limits for the near future.

Figure 10-1
Examples of Management of Contaminated Media at DOE Sites



10.1.2 Organization of Contaminated Media Data

Sections 10.2 and 10.3 provide information about ex-situ contaminated media, and Section 10.4 provides information about in-situ contaminated media. Waste water and ground/surface waste water volumes are excluded from all data in the chapter except those in Section 10.5, which summarizes the data on water associated with contaminated media.

10.1.3 Summary of Sites Managing Ex- and In-Situ Contaminated Media

Table 10-1 identifies the types of contaminated media managed at waste sites included in this chapter.

Table 10-1
Types of Ex- and In-Situ Contaminated Media Managed at DOE and
Commercial Sites Referenced in This Chapter

State	Site	Site Code	TRU	LLW	MLLW	Unspecified
AK	Amchitka Island ^a	AINP				X
CA	General Atomics	GEAT		X		
	Energy Technology Engineering Center	ETEC	X	X	X	
	Laboratory for Energy-Related Health Research	LEHR		X	X	
	Lawrence Berkeley National Laboratory	LABL		X		
CO	Grand Junction Office	GJPO		X	X	
	Rio Blanco ^a	PRBS				X
	Rocky Flats Environmental Technology Site	RFTS		X	X	X
	Rulison Site ^a	PRRS				X
ID	Argonne National Laboratory - West ^a	ANLW		X		
	Idaho National Engineering and Environmental Laboratory ^a	INEEL	X	X	X	
IL	Argonne National Laboratory - East	ANLE		X	X	
KY	Paducah Gaseous Diffusion Plant ^a	PGDP		X	X	
NM	Gasbuggy ^a	PRGB				X
	Gnome-Coach ^a	PGTS				X
	Los Alamos National Laboratory ^a	LANL	X	X	X	
	Sandia National Laboratories - NM	SNLN		X	X	
NV	Central Nevada Test Site ^a	CNTS				X
	Nevada Test Site ^a	NVTS		X	X	
NY	Brookhaven National Laboratory	BRNL		X	X	
OH	Ashtabula Environmental Management Project	AEMP		X	X	
	Columbus Environmental Management Project- West Jefferson (Battelle Columbus Laboratories)	CEMP		X	X	
	Fernald Environmental Management Project	FEMP		X	X	
	Miamisburg Environmental Management Project (Mound)	MEMP		X		
	Portsmouth Gaseous Diffusion Plant ^a	PORT			X	
SC	Savannah River Site ^a	SARS	X	X	X	
	Oak Ridge Reservation ^a	ORTN		X	X	
TN	GTS Duratek ^b	SEG		X		
TX	Pantex Plant	PAPL		X		
UT	Envirocare ^b	ENVR		X	X	
WA	Hanford Site ^a	HASI		X	X	

Notes:

^a Sites with in-situ contaminated media.

^b Commercial (non-DOE) sites.

10.2 Ex-Situ Contaminated Media as Reported by Sites

The following tables and figures provide data on the contaminated media in inventory¹³ and managed in FY 1998 and FY 1999. Table 10-2 and Figures 10-2 and 10-3 provide summary data on all types: low-level waste (LLW), mixed low-level waste (MLLW), transuranic waste (TRU), etc. Tables 10-3 through 10-7 provide more detailed FY 1998 and FY 1999 data on these different types of contaminated media. Data on unspecified (types of) contaminated media are provided in Table 10-8.

Table 10-2
Summary of Total Ex-Situ Contaminated Media Volumes by
Inventory and Management Activity: FY 1998 and FY 1999 Actuals
 (Includes all physical forms except waste water and ground/surface water)

In cubic meters

FY 1998					
	Inventory (Storage)	New Generation	Treatment	Receipts	Disposal
LLW	92,751	411,920	1,588	16,562	402,041
MLLW	1,413	562	-	200	102
TRU ^a	11	-	-	-	-
Total	94,175	412,481	1,588	16,762	402,143

FY 1999					
	Inventory (Storage)	New Generation	Treatment	Receipts	Disposal
LLW	166,870	592,845	35,695	42,501	517,615
MLLW	2,430	11,364	10,164	197	173
TRU ^a	11	-	-	-	-
Unspecified	-	2,675	-	-	-
Total	169,311	606,885	45,859	42,699	517,788

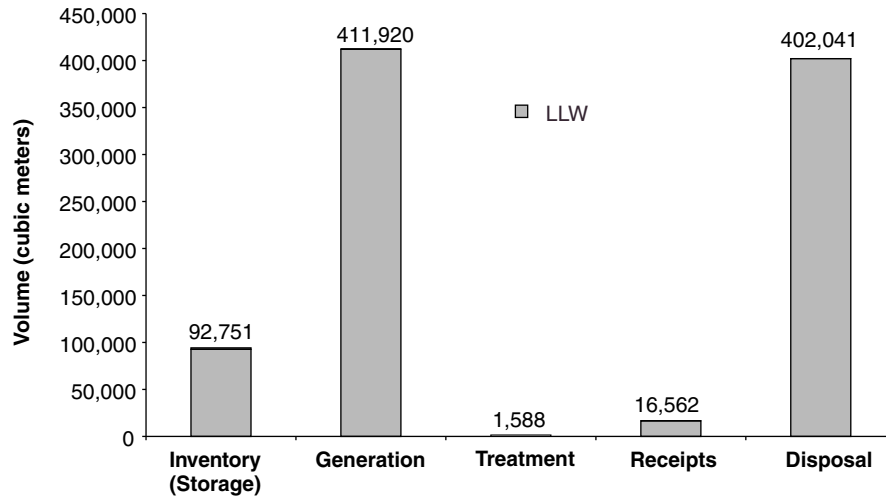
Notes:

- Hyphens indicate volumes of zero.
- Due to rounding, the totals in this table may not equal the exact sum of the site-specific data.

^a TRU is in inventory at Energy Technology Engineering Center in California.

¹³ Data reflect end-of-year inventories.

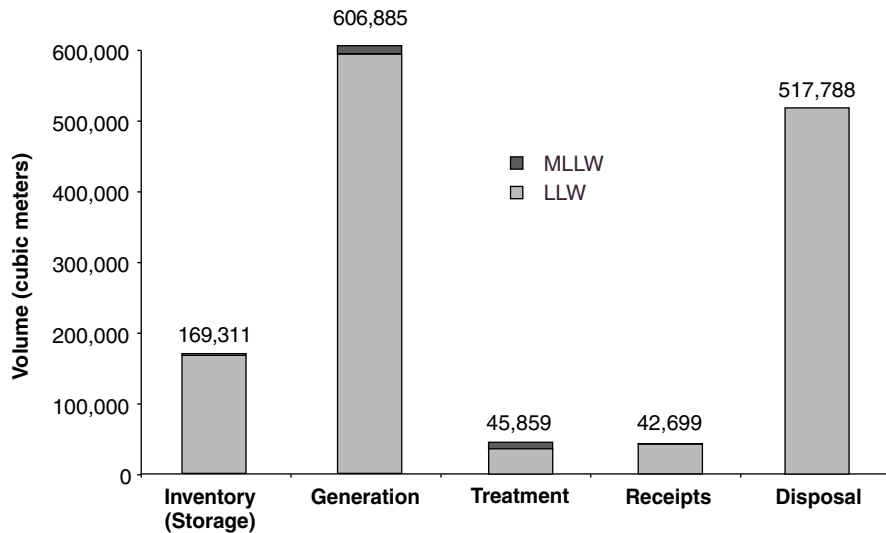
Figure 10-2
Total Volume of Ex-Situ Contaminated Media by Inventory and Management Activity as Reported by Sites: FY 1998 Actuals
 (Includes all physical forms except waste water and ground/surface water)



Note:

- The volumes of MLLW and TRU contaminated media were relatively small and are shown in Table 10-2. There were no unspecified contaminated media volumes reported for FY 1998.

Figure 10-3
Total Volume of Ex-Situ Contaminated Media by Inventory and Management Activity as Reported by Sites: FY 1999 Actuals
 (Includes all physical forms except waste water and ground/surface water)



Note:

- The volumes of TRU and unspecified contaminated media were relatively small and are shown in Table 10-2.

Table 10-3
Total Volume of LLW Contaminated Media in Inventory and Managed
as Reported by Sites: FY 1998 Actuals
(Includes all physical forms except waste water and ground/surface water)

In cubic meters

State	Site	Site Code	Inventory	New Generation	Treatment	Receipts	Disposal
CA	Energy Technology Engineering Center	ETEC	748	451	-	-	-
	Laboratory for Energy Related Health Research	LEHR	567	723	-	-	-
	Lawrence Berkeley National Laboratory	LABL	11	11	-	-	-
CO	Grand Junction Office	GJPO	60	0.04	-	-	-
	Rocky Flats Environmental Technology Site	RFTS	-	-	-	-	-
ID	Argonne National Laboratory - West	ANLW	-	84	-	-	-
IL	Argonne National Laboratory - East	ANLE	66	20	-	-	-
NM	Los Alamos National Laboratory	LANL	-	1,276	-	-	716
	Sandia National Laboratories-NM	SNLN	1,408	1,533	-	-	-
NY	Brookhaven National Laboratory	BRNL	7,752	-	-	-	-
OH	Ashtabula Environmental Management Project	AEMP	5,014	6,567	1,443	-	-
	Columbus Environmental Management Project- West Jefferson (Battelle Columbus Laboratories) ^a	CEMP	38	514	145	-	-
	Fernald Environmental Management Project	FEMP	75,858	104,544	-	-	96,820
	Miamisburg Environmental Management Project (Mound)	MEMP	1,230	5,793	-	-	-
TN	GTS Duratek	SEG	-	-	-	841	-
TX	Pantex Plant	PAPL	-	1,603	-	-	-
UT	Envirocare	ENVR	-	-	-	14,952	14,988
WA	Hanford	HASI	-	288,800	-	-	288,800
n/a	Unspecified ^b		-	-	-	769	717
Total			92,751	411,920	1,588	16,562	402,041

Notes:

- Hyphens indicate volumes of zero.
- Due to data rounding, the totals in this table may not equal the sum of the site-specific data.

^a This site treated some or all of its contaminated media off-site.^b Includes unspecified DOE and commercial sites.

Table 10-4
Total Volume of LLW Contaminated Media in Inventory and Managed
as Reported by Sites: FY 1999 Actuals
(Includes all physical forms except waste water and ground/surface water)

In cubic meters

State	Site	Site Code	Inventory	New Generation	Treatment	Receipts	Disposal
CA	Energy Technology Engineering Center	ETEC	1,603	1,380	-	-	-
	General Atomics	GEAT	-	1,807	-	-	-
	Laboratory for Energy Related Health Research	LEHR	1,358	1,224	-	-	-
	Lawrence Berkeley National Laboratory	LABL	-	7	-	-	-
CO	Grand Junction Office	GJPO	65	5	-	-	-
	Rocky Flats Environmental Technology Site	RFTS	-	-	-	-	-
ID	Argonne National Laboratory - West ^a	ANLW	-	0.3	0.3	-	-
IL	Argonne National Laboratory - East	ANLE	52	16	-	-	-
KY	Paducah Gaseous Diffusion Plant	PGDP	93,354	93,354	-	-	-
NM	Los Alamos National Laboratory	LANL	-	717	-	-	717
	Sandia National Laboratories-NM	SNLN	180	141	-	-	-
NV	Nevada Test Site	NVTS	-	136	-	-	136
NY	Brookhaven National Laboratory ^a	BRNL	15,671	673	340	-	-
OH	Ashtabula Environmental Management Project	AEMP	3,228	1,201	2,875	-	-
	Columbus Environmental Management Project- West Jefferson (Battelle Columbus Laboratories) ^a	CEMP	-	337	238	-	-
	Fernald Environmental Management Project	FEMP	51,113	202,989	32,241	-	195,390
	Miamisburg Environmental Management Project (Mound)	MEMP	-	5,480	-	-	-
TN	GTS Duratek		-	-	-	261	-
TX	Pantex Plant	PAPL	247	25	-	-	-
UT	Envirocare	ENVR	-	-	-	37,039	37,039
WA	Hanford	HASI	-	283,354	-	-	283,354
n/a	Unspecified ^b		-	-	-	5,202	979
Total			166,870	592,845	35,695	42,501	517,615

Notes:

- Hyphens indicate volumes of zero.
- Due to data rounding, the totals in this table may not equal the sum of the site-specific data.

^a This site treated some or all of its contaminated media off-site.^b Includes unspecified DOE and commercial sites.

Table 10-5. Total Volume of MLLW Contaminated Media in Inventory and Managed as Reported by Sites: FY 1998 Actuals

(Includes all physical forms except waste water and ground/surface water)

In cubic meters

State	Site	Site Code	Inventory	New Generation	Receipts	Disposal
CA	Energy Technology Engineering Center	ETEC	22	1	-	-
CO	Grand Junction Office	GJPO	2	0.3	-	-
	Rocky Flats Environmental Technology Site	RFTS	480	-	-	-
IL	Argonne National Laboratory - East	ANLE	35	5	-	-
NM	Los Alamos National Laboratory	LANL	-	40	-	-
	Sandia National Laboratories - NM	SNLN	75	79	-	-
NY	Brookhaven National Laboratory	BRNL	24	-	-	-
OH	Ashtabula Environmental Management Project	AEMP	88	-	-	-
	Columbus Environmental Management Project - West Jefferson (Battelle Columbus Laboratories)	CEMP	4	1	-	-
	Fernald Environmental Management Project	FEMP	683	423	-	-
UT	Envirocare	ENVR	-	-	80	80
WA	Hanford Site	HASI	-	13	-	22
n/a	Unspecified ^a	n/a	-	-	120	-
Total			1,413	562	200	102

Notes:

- Hyphens indicate volumes of zero.
- Due to data rounding, the totals in this table may not equal the sum of the site-specific data.

^a Includes unspecified DOE and commercial sites.

Table 10-6. Total Volume of MLLW Contaminated Media in Inventory and Managed as Reported by Sites: FY 1999 Actuals

(Includes all physical forms except waste water and ground/surface water)

In cubic meters

State	Site	Site Code	Inventory	New Generation	Treatment	Receipts	Disposal
CA	Energy Technology Engineering Center	ETEC	118	116	-	-	-
	Laboratory for Energy-Related Health Research	LEHR		0.4	-	-	-
CO	Grand Junction Office	GJPO	2	0.02	-	-	-
	Rocky Flats Environmental Technology Site	RFTS	480	10,160	10,160	-	-
IL	Argonne National Laboratory - East	ANLE	21	2	-	-	-
NM	Los Alamos National Laboratory	LANL	-	1	-	-	-
	Sandia National Laboratories - NM	SNLN	3	7	-	-	-
NY	Brookhaven National Laboratory	BRNL	8	-	2	-	-
OH	Ashtabula Environmental Management Project	AEMP	71	43	2	-	-
	Columbus Environmental Management Project - West Jefferson (Battelle Columbus Laboratories)	CEMP	3	-	-	-	-
	Fernald Environmental Management Project	FEMP	1724	1,028	-	-	-
UT	Envirocare	ENVR			-	155	155
WA	Hanford Site	HASI	-	7	-	-	18
n/a	Unspecified ^a	n/a	-	-	-	42	-
Total			2,430	11,364	10,164	197	173

Notes:

- Hyphens indicate volumes of zero.
- Due to data rounding, the totals in this table may not equal the sum of the site-specific data.

^a Includes unspecified DOE and commercial sites.

Table 10-7
Total Volume of TRU Contaminated Media in Inventory and Managed as Reported by Sites:
FY 1998 and FY 1999 Actuals

(Includes all physical forms except waste water and ground/surface water)

In cubic meters

FY 1998

State	Site	Site Code	Inventory	Generation	Treatment	Disposal
CA	Energy Technology Engineering Center	ETEC	11	-	-	-
Total			11	0	0	0

FY 1999

State	Site	Site Code	Inventory	Generation	Treatment	Disposal
CA	Energy Technology Engineering Center	ETEC	11	-	-	-
Total			11	0	0	0

Note:

- Hyphens indicate volumes of zero.

Table 10-8
Total Volume of Unspecified Contaminated Media in Inventory and Managed as Reported by Sites:
FY 1999 Actuals

(Includes all physical forms except waste water and ground/surface water)

In cubic meters

State	Site	Site Code	Inventory	Generation	Treatment	Disposal
CO	Rocky Flats Environmental Technology Site	RFTS	-	2,675	-	-
Total			0	2,675	0	0

Note:

- Hyphens indicate volumes of zero.

10.3 Ex-Situ Contaminated Media Projection Data as Reported by Sites

The following tables and figures provide data on the amounts of ex-situ contaminated media projected from FY 2000 through FY 2010. Table 10-9 through 10-13 and Figures 10-4 through 10-8 provide these data for projected end-of-year inventories, "generation," treatment, receipts, and disposal.

Table 10-9. Total Projected Volume of Ex-Situ Contaminated Media Inventories as Reported by Sites: FY 2000 - FY 2010
(Includes all physical forms except waste water and ground/surface water)

In cubic meters

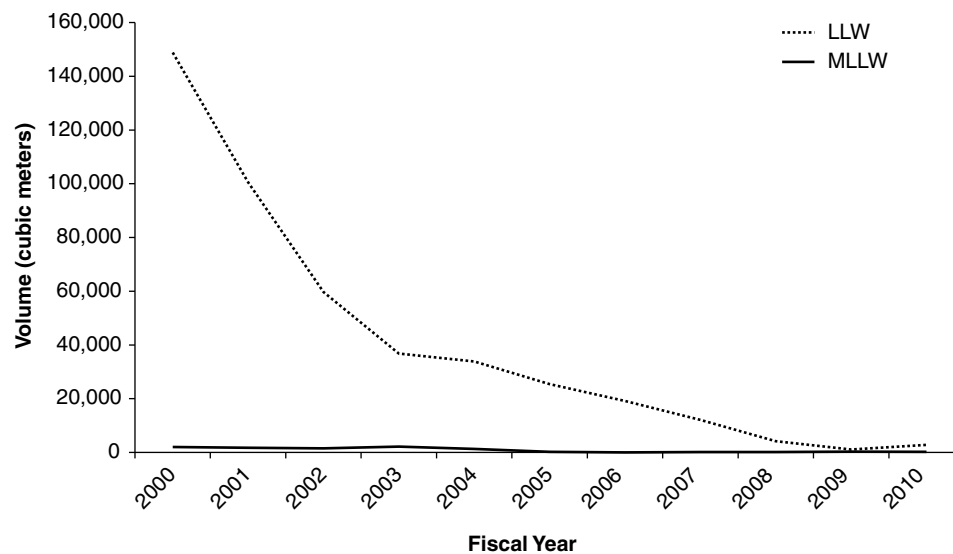
	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005
LLW	148,840	100,580	59,699	36,822	33,838	25,445
MLLW	2,019	1,705	1,516	2,128	1,311	201
TRU	11	11	9	5	5	5
Total	150,870	102,296	61,223	38,955	35,154	25,651

	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
LLW	19,143	12,108	4,156	1,061	2,806
MLLW	48	53	32	431	50
TRU	5	111	173	291	250
Total	19,196	12,272	4,361	1,783	3,106

Note:

- Due to rounding, the totals in this table may not equal the exact sum of the site-specific data.

Figure 10-4. Total Projected Volume of Ex-Situ Contaminated Media Inventories as Reported by Sites: FY 2000 - FY 2010
(Includes all physical forms except waste water and ground/surface water)



Note:

- The total volumes of projected TRU contaminated media in inventory are relatively small and are shown in table 10-9.

Table 10-10
Total Projected Volume of Ex-Situ Contaminated Media Generation
as Reported by Sites: FY 2000 - FY 2010
(Includes all physical forms except waste water and ground/surface water)

In cubic meters

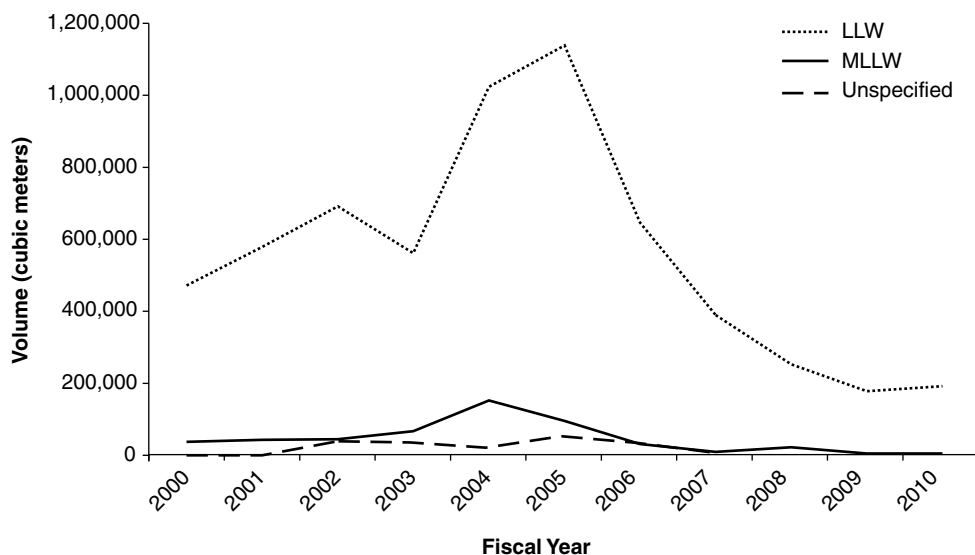
	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005
LLW	471,415	578,753	691,341	561,517	1,023,789	1,138,796
MLLW	37,554	42,821	44,623	67,244	152,551	95,375
TRU	-	3	61	4,804	4,851	4,925
Unspecified	2,810	3,493	39,348	35,606	21,401	53,079
Total	511,779	625,069	775,373	669,171	1,202,593	1,292,175

	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
LLW	646,372	389,444	252,648	177,851	191,826
MLLW	31,216	9,340	22,431	8,641	3,177
TRU	4,846	4,863	4,861	4,977	4,817
Unspecified	34,553	-	-	-	-
Total	716,987	403,648	279,940	191,469	199,820

Notes:

- Hyphens indicate volumes of zero.
- Due to data rounding, the totals in this table may not equal the exact sum of the site-specific data.

Figure 10-5
Total Projected Volume of Ex-Situ Contaminated Media Generation
as Reported by Sites: FY 2000 - FY 2010
(Includes all physical forms except waste water and ground/surface water)



Note:

- The total volumes of projected TRU contaminated media in inventory are relatively small and are shown in Table 10-10.

Table 10-11
Total Projected Volume of Ex-Situ Contaminated Media Treatment
as Reported by Sites: FY 2000 - FY 2010
(Includes all physical forms except waste water and ground/surface water)

In cubic meters

	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005
LLW	114,723	101,543	116,966	145,960	162,329	106,314
MLLW	37,205	41,778	42,922	58,381	90,568	60,988
TRU	-	-	-	4,760	4,762	4,762
Total	151,928	143,321	159,889	209,102	257,659	172,065

	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
LLW	14,592	45,174	11,373	1,253	878
MLLW	26,185	265	909	10	258
TRU	4,762	4,762	4,802	4,862	4,862
Total	45,539	50,201	17,084	6,125	5,998

Notes:

- Hyphens indicate volumes of zero.
- Due to data rounding, the totals in this table may not equal the exact sum of the site-specific data.

Figure 10-6
Total Projected Volume of Ex-Situ Contaminated Media Treatment
as Reported by Sites: FY 2000 - FY 2010
(Includes all physical forms except waste water and ground/surface water)

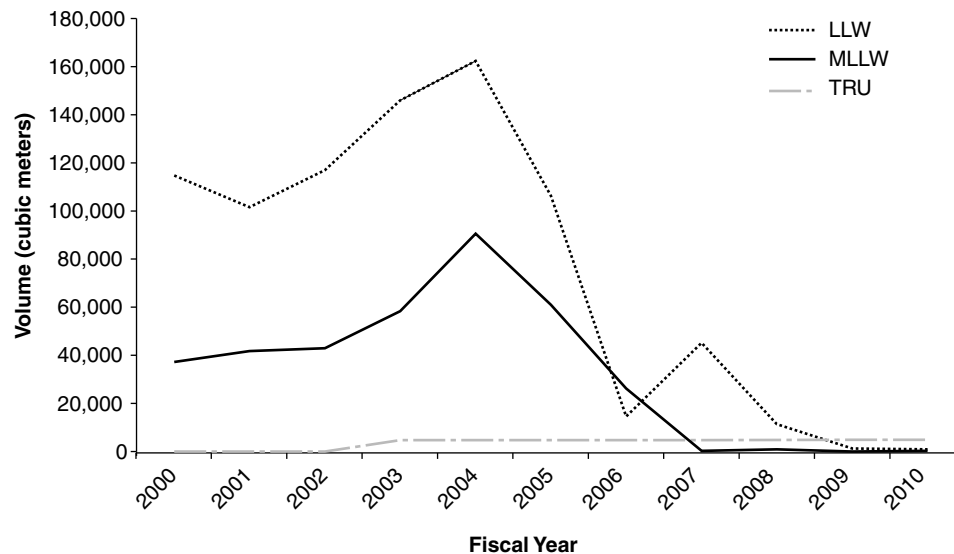


Table 10-12
Total Projected Volume of Ex-Situ Contaminated Media Receipts
as Reported by Sites: FY 2000 - FY 2010
(Includes all physical forms except waste water and ground/surface water)

In cubic meters

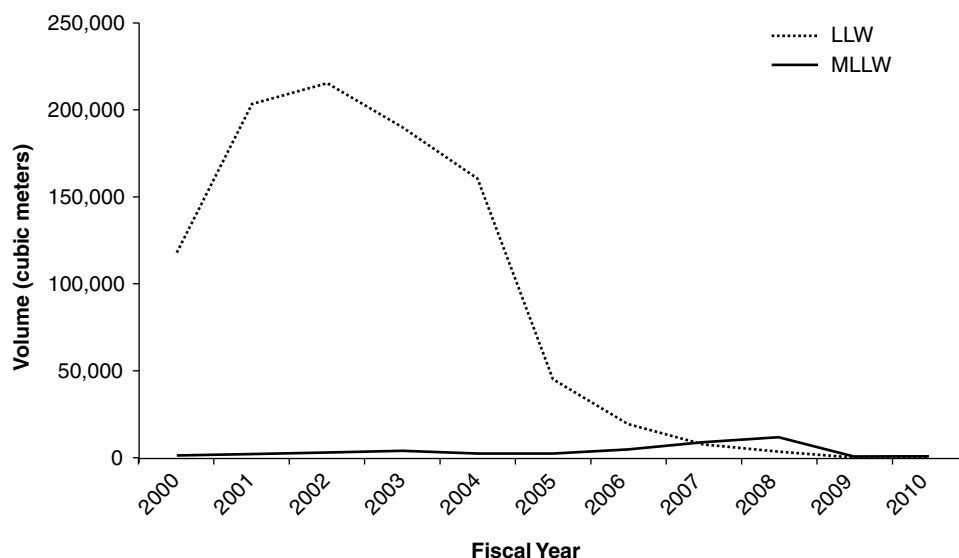
	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005
LLW	117,973	203,367	215,357	190,007	160,444	45,140
MLLW	1,291	2,038	2,929	3,967	2,387	2,413
TRU	-	-	3	10	84	163
Unspecified	-	-	917	-	-	-
Total	119,263	205,405	219,206	193,983	162,915	47,716

	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
LLW	19,299	7,616	3,421	656	811
MLLW	4,769	8,883	11,747	125	631
TRU	84	5	-	-	-
Unspecified	-	-	-	-	-
Total	24,152	16,504	15,168	781	1,442

Notes:

- Hyphens indicate volumes of zero.
- Due to data rounding, the totals in this table may not equal the exact sum of the site-specific data.

Figure 10-7
Total Projected Volume of Ex-Situ Contaminated Media Receipts
as Reported by Sites: FY 2000 - FY 2010
(Includes all physical forms except waste water and ground/surface water)



Note:

- The volumes of projected TRU and unspecified contaminated media receipts are relatively very small and are shown in Table 10-12.

Table 10-13
Total Projected Volume of Ex-Situ Contaminated Media Disposal
as Reported by Sites: FY 2000 - FY 2010
(Includes all physical forms except waste water and ground/surface water)

In cubic meters

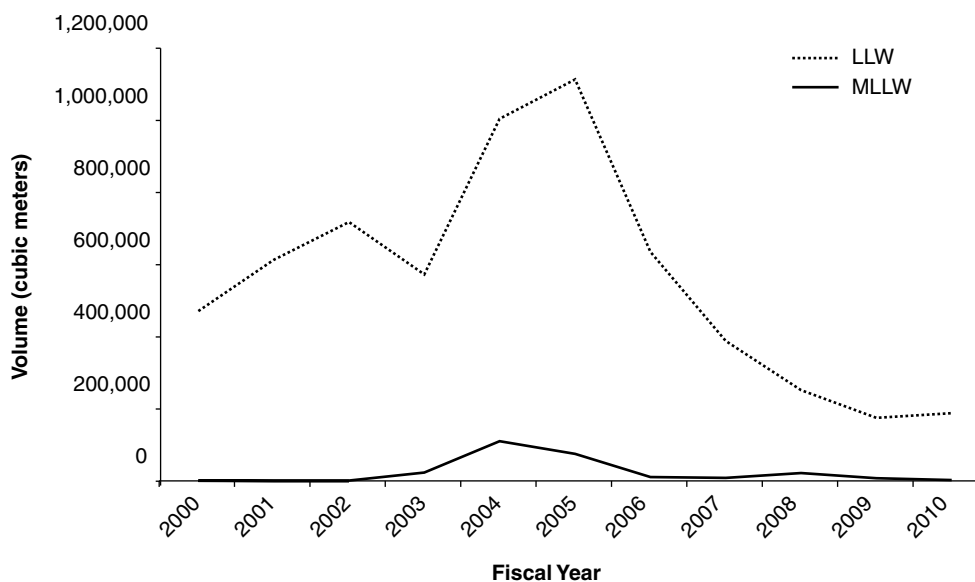
	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005
LLW	471,470	613,460	718,177	573,109	1,004,619	1,113,735
MLLW	1,236	1,847	2,029	24,129	110,806	75,719
TRU	-	-	-	286	371	453
Unspecified	-	-	917	-	-	-
Total	472,706	615,306	721,123	597,525	1,115,796	1,189,907

	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
LLW	635,796	388,527	252,265	175,818	188,789
MLLW	11,610	9,299	22,454	8,243	3,426
TRU	374	295	290	290	290
Total	647,781	398,120	275,009	184,351	192,504

Notes:

- Hyphens indicate volumes of zero.
- Due to data rounding, the totals in this table may not equal the exact sum of the site-specific data.

Figure 10-8
Total Projected Volume of Ex-Situ Contaminated Media Disposal
as Reported by Sites: FY 2000 - FY 2010
(Includes all physical forms except waste water and ground/surface water)



Note:

- The volumes of projected TRU and unspecified contaminated media disposal are relatively very small and are shown in Table 10-13.

10.4 In-Situ Contaminated Media as Reported by Sites

In-situ contaminated media are contaminated media that have been remediated, or are likely to be remediated, without excavation by using strategies that destroy, isolate, or prevent any further spread of contaminants into the surrounding environment¹⁴ (e.g., in-situ treatment, capping in place, and institutional controls).

The tables and figure in this section present data on the estimated volumes of in-situ contaminated media as of FY 1999. Summary Table 10-14 and Figure 10-9 provide total estimates for each type of in-situ contaminated media: LLW, MLLW, TRU, and unspecified. Tables 10-15 through 10-18 provide more detailed site data estimates for each of these in-situ contaminated media types.

Table 10-14
Summary of Total In-Situ Contaminated Media Volume
as Reported by Sites^a
(Includes all physical forms except ground/surface water)

In cubic meters

Media Type	Total Volume
LLW	25,798,617
MLLW	2,217,343
TRU	282,340
Unspecified	267,985
Total	28,566,285

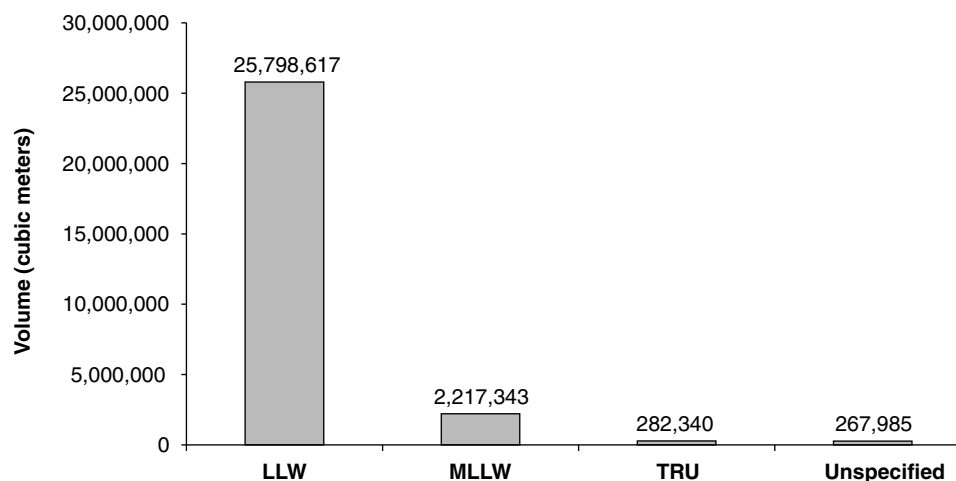
Notes:

- For in-situ contaminated media, DOE sites are requested to report the current year's total estimated volume (entered as an average or a range). For these quantities, DOE sites are also requested to report one or more management activities for the entire quantity, not for specific future years or year ranges.

^a Data are estimated in-situ contaminated media volumes as of FY 1999.

¹⁴ U.S. Department of Energy, Office of Environmental Management, *FY 2000 Detailed Guidance for the Integrated Planning, Accountability, and Budgeting System-Information System (IPABS-IS) Volume 2*, (February 2000).

Figure 10-9
Total Volume of In-Situ Contaminated Media as Reported by Sites^a
 (Includes all physical forms except ground/surface water)



Notes:

- For in-situ contaminated media, DOE sites are requested to report the current year's total estimated volume (entered as an average or a range). For these quantities, DOE sites are also requested to report one or more management activities for the entire quantity, not for specific future years or year ranges.

^a Data are estimated in-situ contaminated media volumes as of FY 1999.

Table 10-15
Total Volume of LLW In-Situ Contaminated Media as Reported by Sites^a
 (Includes all physical forms except ground/surface water)

In cubic meters

State	Site	Site Code	Management Activity						
			Combination of Access/Inst. Controls	Access/Inst. Controls - TBD	Cap in Place	In-Situ Containment - Combination	Soil Mixing/Grouting	Monitoring	Phyto-Remediation
ID	Argonne National Laboratory West	ANLW	-	-	-	-	-	-	13,947
	Idaho National Engineering and Environmental Laboratory	INEEL	59,861	17	339,641	-	-	-	-
NM	Los Alamos National Laboratory	LANL	-	-	291,430	-	-	-	-
NV	Nevada Test Site	NVTS	127,444	-	-	1,954,638	-	-	-
SC	Savannah River Site	SARS	-	-	898,576	-	431,770	27,799	-
TN	Oak Ridge Reservation	ORTN	-	-	-	1,653,494	-	-	-
WA	Hanford Site	HASI	-	-	20,000,000	-	-	-	-
Total			187,305	17	21,529,647	3,608,132	431,770	27,799	13,947

Notes:

- Hyphens indicate volumes of zero.
- For in-situ contaminated media, DOE sites are requested to report the current year's total estimated volume (entered as an average or a range). For these quantities, DOE sites are also requested to report one or more management activities for the entire quantity, not for specific future years or year ranges.
- Data are rounded to the nearest cubic meter.
- Definitions of in-situ management activities can be found in the glossary of this report.

^a Data are estimated in-situ contaminated media volumes as of FY 1999.

Table 10-16
Total Volume of MLLW In-Situ Contaminated Media as Reported by Sites^a
(Includes all physical forms except ground/surface water)

In cubic meters

State	Site	Site Code	Management Activity					
			Combination of Access/Instit. Controls	Cap in Place	In-Situ Containment - Combination	Diversions/ Surface Control	Chemical Stabilization/ Grouting	Phyto-Remediation
ID	Idaho National Engineering and Environmental Laboratory	INEEL	-	422,950	-	311,520	-	-
	Argonne National Laboratory - West	ANLW	-	-	-	-	-	152
KY	Paducah Gaseous Diffusion Plant	PGDP	-	-	3,036	-	-	-
NM	Los Alamos National Laboratory	LANL	-	30,100	-	-	-	-
	Sandia National Laboratories-NM	SNLN	-	2,831	-	-	-	-
NV	Nevada Test Site	NVTS	13,481	-	-	-	-	-
OH	Portsmouth Gaseous Diffusion Plant	PORT	-	-	27	-	-	-
SC	Savannah River Site	SARS	-	-	-	-	25,001	-
TN	Oak Ridge Reservation	ORTN	-	-	1,408,246	-	-	-
Total			13,481	455,881	1,411,308	311,520	25,001	152

Notes:

- Hyphens indicate volumes of zero.
- For in-situ contaminated media, DOE sites are requested to report the current year's total estimated volume (entered as an average or a range). For these quantities, DOE sites are also requested to report one or more management activities for the entire quantity, not for specific future years or year ranges.
- MLLW In-situ data in the CID are reported to the nearest cubic meter. Data in this table reflect the data in the CID.
- Definitions of in-situ management activities can be found in the glossary of this report.

^a Data are estimated in-situ contaminated media volumes as of FY 1999.

Table 10-17
Total Volume of TRU In-Situ Contaminated Media as Reported by Sites^a
(Includes all physical forms except ground/surface water)

In cubic meters

State	Site	Site Code	Management Activity	
			Cap in Place	Chemical Stabilization/ Grouting
ID	Idaho National Engineering and Environmental Laboratory	INEEL	3,679	-
NM	Los Alamos National Laboratory	LANL	278,629	-
SC	Savannah River Site	SARS	-	32
Total			282,308	32

Notes:

- Hyphens indicate volumes of zero.
- For in-situ contaminated media, DOE sites are requested to report the current year's total estimated volume (entered as an average or a range). For these quantities, DOE sites are also requested to report one or more management activities for the entire quantity, not for specific future years or year ranges.
- TRU in-situ data in the CID are reported to the nearest cubic meter. Data in this table reflect the data in the CID.
- Definitions of in-situ management activities can be found in the glossary of this report.

^a Data are estimated in-situ contaminated media volumes as of FY 1999.

Table 10-18
Total Volume of Unspecified In-Situ Contaminated Media as Reported by Sites^a
 (Includes all physical forms except ground/surface water)

In cubic meters

State	Site	Site Code	Management Activity
			In-Situ Containment - Combination
AK	Amchitka Island	AINP	120,503
CO	Rio Blanco	PRBS	1,600
	Rulison Site	PRRS	18,656
NM	Gasbuggy	PRGB	16,154
	Gnome-Coach	PGTS	27,440
NV	Central Nevada Test Site	CNTS	83,448
	Project Shoal	PRST	184
Total			267,985

Notes:

- For in-situ contaminated media, DOE sites are requested to report the current year's total estimated volume (entered as an average or a range). For these quantities, DOE sites are also requested to report one or more management activities for the entire quantity, not for specific future years or year ranges.
- Unspecified in-situ data in the CID are reported to the nearest cubic meter. Data in this table reflect the data in the CID.
- Definitions of in-situ management activities can be found in the glossary of this report.

^a Data are estimated in-situ contaminated media volumes as of FY 1999.

10.5 Ex- and In-Situ Contaminated Media Waste Water and Ground/ Surface Water Summary

This section provides information on the volumes of waste water and ground/surface water associated with ex- and in-situ¹⁵ contaminated media as reported by sites. All ex- and in-situ contaminated media volumes previously shown in this chapter have excluded waste water and ground/surface water because, when all physical forms are viewed simultaneously, the dominance of waste water and ground/surface water overshadows the importance of the other physical forms that comprise ex- and in-situ contaminated media. Excluding waste water and ground/surface water allows more directed interpretation.

Physical forms that comprise ex- and in-situ contaminated media range from soil to ground/surface water to debris. When all physical forms are considered simultaneously, the primary physical forms of ex-situ contaminated media are waste water and ground/surface water, and the primary physical form of in-situ contaminated media is ground/surface water. As shown in Table 10-19, the volumes of waste water and ground/surface water dominate LLW and MLLW ex-situ contaminated media generation and treatment, but contribute little to the total disposal volume (<1percent). In FY 1998 and FY 1999, waste water and ground/surface water comprised approximately 99 percent of the LLW and MLLW ex-situ contaminated media generated and treated. As shown in Table 10-20, ground/surface water dominates LLW in-situ contaminated media (99 percent), but comprises a very small percentage of MLLW volume (0.02 percent) and none of TRU or unspecified in-situ contaminated media.

¹⁵ Sites did not report any waste water data for in-situ contaminated media.

Table 10-19
Contribution of Waste Water and Ground/Surface Water to Total Volume of
Ex-Situ Contaminated Media: FY 1998 and FY 1999 Actuals

In cubic meters

LLW

	Physical Form	FY 1998	% 1998 Total	FY 1999	% 1999 Total
Inventory	Waste Water and Ground/Surface Water	17,411,853	99.5	15,897,818	99.0
	Total (All Physical Forms)	17,504,604	100	16,064,688	100
New Generation	Waste Water and Ground/Surface Water	53,663,686	99.2	52,144,739	98.9
	Total (All Physical Forms)	54,075,606	100	52,737,585	100
Treatment	Waste Water and Ground/Surface Water	53,663,686	99.9	53,658,715	99.9
	Total (All Physical Forms)	53,665,274	100	53,694,410	100
Disposal	Waste Water and Ground/Surface Water	-	-	28	0.01
	Total (All Physical Forms)	0	0	517,643	100

MLLW

	Physical Form	FY 1998	%1998 Total	FY 1999	% 1999 Total
Inventory	Waste Water and Ground/Surface Water	762	35.0	762	23.9
	Total (All Physical Forms)	2,175	100	3,192	100
New Generation	Waste Water and Ground/Surface Water	1,091,703	99.9	1,118,155	99.0
	Total (All Physical Forms)	1,092,265	100	1,129,520	100
Treatment	Waste Water and Ground/Surface Water	1,091,703	100	1,118,155	99.1
	Total (All Physical Forms)	1,091,703	100	1,128,319	100
Disposal	Waste Water and Ground/Surface Water	-	-	0.2	0.1
	Total (All Physical Forms)	0	0	173	100

Note:

- Hyphens indicate volumes of zero.

Table 10-20
Contribution of Ground/Surface Water to Total Volumes of
In-Situ Contaminated Media as Reported by Sites

In cubic meters

	Ground/ Surface Water	All Other Physical Forms (excluding ground/surface water)	Total	Ground/Surface Water % of Total
LLW	4,700,211,447	25,798,617	4,726,010,064	99.5
MLLW	474	2,217,343	2,217,817	<1
TRU	-	282,340	282,340	-
Unspecified	-	267,985	267,985	-

Notes:

- Hyphens indicate volumes of zero.
- Due to data rounding, the totals in this table may not equal the exact sum of the site-specific data.
- For in-situ contaminated media, DOE sites are requested to report the current year's total estimated volume (entered as an average or a range). For these quantities, DOE sites are also requested to report one or more management activity for the entire quantity, not for specific future years or year ranges.
- Definitions of in-situ management activities can be found in the glossary of this report.
- Data are estimated in-situ contaminated media volumes as of FY 1999.